

Table ES-1. Summary of risks to the microbial community estimated from multiple lines of evidence in the Calcasieu Estuary.

Area of Concern (AOC)/Reach	n	Average mean Risk Score	Predicted Risk		
			<i>Percent (n) of Samples/Risk Category</i>		
			Low	Indeterminate	High
<i>Upper Calcasieu River AOC</i>					
Upper Calcasieu River - Mainstem	49	0.335	90% (44)	10% (5)	0% (0)
Clooney Island Loop	32	1.12	66% (21)	34% (11)	0% (0)
Contraband Bayou	9	0.167	100% (9)	0% (0)	0% (0)
Coon Island Loop	56	0.936	71% (40)	29% (16)	0% (0)
Overall UCR AOC	146	0.727	78% (114)	22% (32)	0% (0)
<i>Bayou d'Inde AOC</i>					
Upper Bayou d'Inde	53	1.92	38% (20)	62% (33)	0% (0)
Middle Bayou d'Inde	93	2.85	6% (6)	94% (87)	0% (0)
Lower Bayou d'Inde - Mainstem	38	2.49	21% (8)	79% (30)	0% (0)
Lower Bayou d'Inde - Lockport Marsh	125	2.08	35% (44)	65% (81)	0% (0)
PPG Canal	6	1.73	83% (5)	17% (1)	0% (0)
Overall BI AOC	315	2.32	26% (83)	74% (232)	0% (0)
<i>Middle Calcasieu River AOC</i>					
Middle Calcaiseu River - Mainstem	76	0.789	74% (56)	26% (20)	0% (0)
Prien Lake and upper old river channel	49	0.490	84% (41)	16% (8)	0% (0)
Indian Wells Lagoon	10	2.39	30% (3)	70% (7)	0% (0)
Bayou Olsen	11	0	100% (11)	0% (0)	0% (0)
Moss Lake	17	1.75	47% (8)	53% (9)	0% (0)
Overall MCR AOC	163	0.845	73% (119)	27% (44)	0% (0)
<i>AOC Subtotal</i>	624	1.56	51% (316)	49% (308)	0% (0)
<i>Reference</i>					
Bayou Choupique	4	0.750	100% (4)	0% (0)	0% (0)
Grand Bayou	3	0	100% (3)	0% (0)	0% (0)
Bayou Bois Connine	2	0	100% (2)	0% (0)	0% (0)
Johnson Bayou	6	0	100% (6)	0% (0)	0% (0)
Willow Bayou	2	0	100% (2)	0% (0)	0% (0)
Overall Reference Areas	17	0.176	100% (17)	0% (0)	0% (0)
<i>Entire Estuary</i>	641	1.53	52% (333)	48% (308)	0% (0)

n = number of samples.

Overall risk of High assigned for samples with a final risk score of >3; overall risk of Indeterminate assigned for samples with a final risk score of 2 - 3; overall risk of Low assigned for samples with a final risk score of 0 to <2.

Table ES-2. Summary of risks to aquatic plants estimated from multiple lines of evidence in the Calcasieu Estuary.

Area of Concern (AOC)/Reach	n	Average mean Risk Score	Predicted Risk		
			Percent (n) of Samples/Risk Category		
			Low	Indeterminate	High
<i>Upper Calcasieu River AOC</i>					
Upper Calcasieu River - Mainstem	14	0.732	86% (12)	7% (1)	7% (1)
Clooney Island Loop	7	2.10	57% (4)	0% (0)	43% (3)
Contraband Bayou	7	0.893	86% (6)	0% (0)	14% (1)
Coon Island Loop	13	1.61	69% (9)	0% (0)	31% (4)
Overall UCR AOC	41	1.27	76% (31)	2% (1)	22% (9)
<i>Bayou d'Inde AOC</i>					
Upper Bayou d'Inde	10	1.83	60% (6)	0% (0)	40% (4)
Middle Bayou d'Inde	11	1.60	64% (7)	9% (1)	27% (3)
Lower Bayou d'Inde - Mainstem	7	0.857	86% (6)	14% (1)	0% (0)
Lower Bayou d'Inde - Lockport Marsh	18	1.99	56% (10)	6% (1)	39% (7)
PPG Canal	6	3.11	33% (2)	0% (0)	67% (4)
Overall BI AOC	52	1.85	60% (31)	6% (3)	35% (18)
<i>Middle Calcasieu River AOC</i>					
Middle Calcasieu River - Mainstem	10	0.200	90% (9)	10% (1)	0% (0)
Prien Lake and upper old river channel	13	0.410	92% (12)	0% (0)	8% (1)
Indian Wells Lagoon	3	3.19	33% (1)	0% (0)	67% (2)
Bayou Olsen	5	0.533	80% (4)	20% (1)	0% (0)
Moss Lake	6	1.00	83% (5)	0% (0)	17% (1)
Overall MCR AOC	37	0.691	84% (31)	5% (2)	11% (4)
<i>AOC Subtotal</i>	130	1.34	72% (93)	5% (6)	24% (31)
<i>Reference</i>					
Bayou Choupique	4	0.333	100% (4)	0% (0)	0% (0)
Grand Bayou	3	1.78	67% (2)	0% (0)	33% (1)
Bayou Bois Connine	2	2.67	50% (1)	0% (0)	50% (1)
Johnson Bayou	4	0.480	100% (4)	0% (0)	0% (0)
Willow Bayou	2	0.333	100% (2)	0% (0)	0% (0)
Overall Reference Areas	15	0.972	87% (13)	0% (0)	13% (2)
<i>Entire Estuary</i>	145	1.30	73% (106)	4% (6)	23% (33)

n = number of samples.

Overall risk of High assigned for samples with a final risk score of >3; overall risk of Indeterminate assigned for samples with a final risk score of 2 - 3; overall risk of Low assigned for samples with a final risk score of 0 to <2.

Table ES-3. Summary of risks to the benthic invertebrate community estimated from multiple lines of evidence in the Calcasieu Estuary.

Area of Concern (AOC)/Reach	n	Average mean Risk Score	Predicted Risk		
			<i>Percent (n) of Samples/Risk Category</i>		
			Low	Indeterminate	High
<i>Upper Calcasieu River AOC</i>					
Upper Calcasieu River - Mainstem	49	0.519	94% (46)	4% (2)	2% (1)
Clooney Island Loop	32	1.25	78% (25)	3% (1)	19% (6)
Contraband Bayou	9	1.23	89% (8)	11% (1)	0% (0)
Coon Island Loop	56	0.816	84% (47)	4% (2)	13% (7)
Overall UCR AOC	146	0.838	86% (126)	4% (6)	10% (14)
<i>Bayou d'Inde AOC</i>					
Upper Bayou d'Inde	53	1.86	58% (31)	15% (8)	26% (14)
Middle Bayou d'Inde	93	3.01	26% (24)	13% (12)	61% (57)
Lower Bayou d'Inde - Mainstem	38	1.53	68% (26)	13% (5)	18% (7)
Lower Bayou d'Inde - Lockport Marsh	125	1.90	57% (71)	14% (17)	30% (37)
PPG Canal	6	3.24	17% (1)	33% (2)	50% (3)
Overall BI AOC	315	2.20	49% (153)	14% (44)	37% (118)
<i>Middle Calcasieu River AOC</i>					
Middle Calcasieu River - Mainstem	76	0.475	91% (69)	7% (5)	3% (2)
Prien Lake and upper old river channel	49	0.270	96% (47)	4% (2)	0% (0)
Indian Wells Lagoon	10	4.33	10% (1)	0% (0)	90% (9)
Bayou Olsen	11	0.512	100% (11)	0% (0)	0% (0)
Moss Lake	17	0.691	94% (16)	6% (1)	0% (0)
Overall MCR AOC	163	0.674	88% (144)	5% (8)	7% (11)
<i>AOC Subtotal</i>	624	1.48	68% (423)	9% (58)	23% (143)
<i>Reference</i>					
Bayou Choupique	4	0.515	100% (4)	0% (0)	0% (0)
Grand Bayou	3	1.63	67% (2)	33% (1)	0% (0)
Bayou Bois Connine	2	1.36	100% (2)	0% (0)	0% (0)
Johnson Bayou	6	0.051	100% (6)	0% (0)	0% (0)
Willow Bayou	2	0.153	100% (2)	0% (0)	0% (0)
Overall Reference Areas	17	0.605	94% (16)	6% (1)	0% (0)
<i>Entire Estuary</i>	641	1.46	68% (439)	9% (59)	22% (143)

n = number of samples.

Overall risk of High assigned for samples with a final risk score of >3; overall risk of Indeterminate assigned for samples with a final risk score of 2 - 3; overall risk of Low assigned for samples with a final risk score of 0 to <2.

Table ES-4. Biological conditions that occur within the three categories of risk to the benthic invertebrate community in the Calcasieu Estuary, identified using the risk designations assigned to each sample.

Benthic Metric/Toxicity Test	Endpoint Measured	Low	Indeterminate	High
		mean \pm SD (n)	mean \pm SD (n)	mean \pm SD (n)
<i>Sediment Toxicity</i>				
28-d <i>Hyaella azteca</i>	% survival	91.6 \pm 7.03 (54)	80.5 \pm 19.5 (15)	53.6 \pm 28.6 (20)
28-d <i>Hyaella azteca</i>	length (mm)	3.82 \pm 0.487 (54)	3.80 \pm 0.625 (15)	3.76 \pm 0.555 (19)
10-d <i>Ampelisca abdita</i>	% survival	62.4 \pm 17.3 (54)	43.1 \pm 23.6 (15)	15.5 \pm 17.6 (20)
60-m <i>Arbacia punctulata</i>	% fertilization	68.4 \pm 25.8 (30)	56.2 \pm 36.2 (10)	23.0 \pm 29.1 (5)
<i>Benthic Invertebrate Community Structure</i>				
Mean total abundance (H/H)	#/35.4 cm sq.	3.94 \pm 3.38 (54)	1.48 \pm 1.54 (15)	1.52 \pm 2.63 (20)
Mean total abundance (H/M)	#/35.4 cm sq.	3.53 \pm 5.04 (54)	0.787 \pm 0.955 (15)	0.420 \pm 0.908 (20)
Mean total abundance (L/L)	#/35.4 cm sq.	0.300 \pm 1.18 (54)	0.760 \pm 2.94 (15)	0 \pm 0 (20)
Mean total abundance (M/H)	#/35.4 cm sq.	0.0667 \pm 0.145 (54)	0.0667 \pm 0.209 (15)	0.0200 \pm 0.0894 (20)
Mean total abundance (M/L)	#/35.4 cm sq.	0.633 \pm 1.78 (54)	0.587 \pm 2.27 (15)	0 \pm 0 (20)
Mean total abundance (M/M)	#/35.4 cm sq.	0.548 \pm 0.734 (54)	0.293 \pm 0.506 (15)	0.0800 \pm 0.151 (20)
Nonnormalized mIBI	no units	9.15 \pm 8.59 (54)	6.88 \pm 14.0 (15)	2.56 \pm 2.07 (20)
Normalized mIBI	no units	0.495 \pm 0.177 (54)	0.354 \pm 0.136 (15)	0.299 \pm 0.058 (20)
Pollution Indicator Spp. (H/H + H/M + M/H)	#/35.4 cm sq.	7.54 \pm 7.65 (54)	2.33 \pm 2.00 (15)	1.96 \pm 3.03 (20)
Pollution Sensitive (L/L + M/L)	#/35.4 cm sq.	0.933 \pm 2.32 (54)	1.35 \pm 5.22 (15)	0 \pm 0 (20)
Richness = total # sp.	# species/35.4 cm sq.	6.72 \pm 4.38 (54)	3.87 \pm 3.64 (15)	2.45 \pm 1.93 (20)
Total Abundance	#/35.4 cm sq.	9.03 \pm 8.38 (54)	4.00 \pm 7.35 (15)	2.07 \pm 3.14 (20)

SD = standard deviation; n = number of samples; d = day; m = minute; H = high; M = medium; L = low; sp. = species; mIBI = macroinvertebrate index of biotic integrity.

Table ES-5. Summary of risks to fish estimated from multiple lines of evidence in the Calcasieu Estuary.

Area of Concern (AOC)/Reach	n	Average mean Risk Score	Predicted Risk		
			<i>Percent (n) of Samples/Risk Category</i>		
			Low	Indeterminate	High
<i>Upper Calcasieu River AOC</i>					
Upper Calcasieu River - Mainstem	49	0.250	98% (48)	0% (0)	2% (1)
Clooney Island Loop	32	1.26	75% (24)	3% (1)	22% (7)
Contraband Bayou	9	0.574	89% (8)	11% (1)	0% (0)
Coon Island Loop	65	1.13	72% (47)	8% (5)	20% (13)
Overall UCR AOC	155	0.846	82% (127)	5% (7)	14% (21)
<i>Bayou d'Inde AOC</i>					
Upper Bayou d'Inde	53	1.71	60% (32)	4% (2)	36% (19)
Middle Bayou d'Inde	93	3.81	8% (7)	5% (5)	87% (81)
Lower Bayou d'Inde - Mainstem	38	3.07	24% (9)	5% (2)	71% (27)
Lower Bayou d'Inde - Lockport Marsh	126	2.45	40% (51)	6% (8)	53% (67)
PPG Canal	6	2.12	33% (2)	67% (4)	0% (0)
Overall BI AOC	316	2.79	32% (101)	7% (21)	61% (194)
<i>Middle Calcasieu River AOC</i>					
Middle Calcasieu River - Mainstem	76	0.605	87% (66)	3% (2)	11% (8)
Prien Lake and upper old river channel	49	0.324	96% (47)	0% (0)	4% (2)
Indian Wells Lagoon	10	3.30	10% (1)	30% (3)	60% (6)
Bayou Olsen	11	0.162	100% (11)	0% (0)	0% (0)
Moss Lake	17	1.01	82% (14)	0% (0)	18% (3)
Overall MCR AOC	163	0.697	85% (139)	3% (5)	12% (19)
<i>AOC Subtotal</i>	634	1.78	58% (367)	5% (33)	37% (234)
<i>Reference</i>					
Bayou Choupique	4	0.572	100% (4)	0% (0)	0% (0)
Grand Bayou	3	0.741	100% (3)	0% (0)	0% (0)
Bayou Bois Connine	2	1.11	100% (2)	0% (0)	0% (0)
Johnson Bayou	6	0.257	100% (6)	0% (0)	0% (0)
Willow Bayou	2	0.222	100% (2)	0% (0)	0% (0)
Overall Reference Areas	17	0.513	100% (17)	0% (0)	0% (0)
<i>Entire Estuary</i>	651	1.74	59% (384)	5% (33)	36% (234)

n = number of samples.

Overall risk of High assigned for samples with a final risk score of >3; overall risk of Indeterminate assigned for samples with a final risk score of 2 - 3; overall risk of Low assigned for samples with a final risk score of 0 to <2.

Table ES-6. Summary of integrated risks to aquatic receptors (i.e., microorganisms, aquatic plants, benthic invertebrates, and fish) estimated from multiple lines of evidence in the Calcasieu Estuary.

Area of Concern (AOC)/Reach	n	Average Overall Risk Score	Predicted Risk		
			Percent (n) of Samples/Risk Category		
			Low	Indeterminate	High
<i>Upper Calcasieu River AOC</i>					
Upper Calcasieu River - Mainstem	49	0.380	98% (48)	2% (1)	0% (0)
Clooney Island Loop	32	1.25	75% (24)	3% (1)	22% (7)
Contraband Bayou	9	0.660	100% (9)	0% (0)	0% (0)
Coon Island Loop	65	0.942	77% (50)	8% (5)	15% (10)
Overall UCR AOC	155	0.811	85% (131)	5% (7)	11% (17)
<i>Bayou d'Inde AOC</i>					
Upper Bayou d'Inde	53	1.84	57% (30)	11% (6)	32% (17)
Middle Bayou d'Inde	93	3.20	9% (8)	18% (17)	73% (68)
Lower Bayou d'Inde - Mainstem	38	2.30	37% (14)	26% (10)	37% (14)
Lower Bayou d'Inde - Lockport Marsh	126	2.15	40% (50)	17% (22)	43% (54)
PPG Canal	6	2.55	33% (2)	17% (1)	50% (3)
Overall BI AOC	316	2.43	33% (104)	18% (56)	49% (156)
<i>Middle Calcasieu River AOC</i>					
Middle Calcasieu River - Mainstem	76	0.608	89% (68)	5% (4)	5% (4)
Prein Lake and upper old river channel	49	0.355	98% (48)	0% (0)	2% (1)
Indian Wells Lagoon	10	3.35	10% (1)	10% (1)	80% (8)
Bayou Olsen	11	0.229	100% (11)	0% (0)	0% (0)
Moss Lake	17	1.15	82% (14)	6% (1)	12% (2)
Overall MCR AOC	163	0.732	87% (142)	4% (6)	9% (15)
<i>AOC Subtotal</i>	634	1.60	59% (377)	11% (69)	30% (188)
<i>Reference</i>					
Bayou Choupique	4	0.543	100% (4)	0% (0)	0% (0)
Grand Bayou	3	1.04	100% (3)	0% (0)	0% (0)
Bayou Bois Connine	2	1.28	100% (2)	0% (0)	0% (0)
Johnson Bayou	6	0.192	100% (6)	0% (0)	0% (0)
Willow Bayou	2	0.177	100% (2)	0% (0)	0% (0)
Overall Reference Areas	17	0.550	100% (17)	0% (0)	0% (0)
<i>Entire Estuary</i>	651	1.57	61% (394)	11% (69)	29% (188)

n = number of samples.

Overall risk of High assigned for samples with a final risk score of >3; overall risk of Indeterminate assigned for samples with a final risk score of 2 - 3; overall risk of Low assigned for samples with a final risk score of 0 to <2.

Table ES-7. Summary of Contaminants of Concern (COCs) in the Calcasieu Estuary.

Chemicals of Potential Concern (COPCs)	Microbial Community	Aquatic Plant Community		Benthic Invertebrate Community		Fish Community		
	WS	SW	PW	WS	PW	SW	WS	PW
<i>Conventionals</i>								
Hydrogen sulfide					*			*
Nitrogen, as Ammonia		*						
Total dissolved sulfide								
Ammonia - Toxic Units								
<i>Metals</i>								
Chromium, total				*				*
Chromium, filtered								
Copper, total				*				*
Copper, filtered		*				*		
Lead, total				*				*
Lead, filtered								
Mercury, total				*				*
Mercury, filtered								
Methyl mercury								
Nickel, total		*			*	*	*	*
Nickel, filtered		*				*		
Zinc, total				*	*			*
Zinc, filtered								
<i>PAHs</i>								
1,1'-Biphenyl	*							
1-Methylnaphthalene					*			
1-Methylphenanthrene								
2,6-Dimethylnaphthalene								
2-Methylnaphthalene	*			*				*
Acenaphthene	*			*				*
Acenaphthylene	*			*				*
Anthracene	*			*				*
Fluorene	*			*				*
Naphthalene	*							*
Phenanthrene	*			*				*
Total LMW-PAHs	*			*				*
Benz(a)anthracene	*		*	*	*			*
Benzo(a)pyrene	*			*	*			*
Benzo(b)fluoranthene	*			*				
Benzo(g,h,i)perylene	*			*				
Benzo(k)fluoranthene	*			*				
Chrysene	*			*				*
Dibenz(a,h)anthracene	*			*				*

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Chemicals of Potential Concern (COPCs)	Microbial Community	Aquatic Plant Community		Benthic Invertebrate Community		Fish Community		
	WS	SW	PW	WS	PW	SW	WS	PW
<i>PAHs (cont.)</i>								
Fluoranthene	*			*			*	
Indeno(1,2,3-cd)pyrene	*			*				
Perylene								
Pyrene	*			*			*	
Total HMW-PAHs	*			*			*	
TOTAL PAHs	*			*			*	
<i>PCB Aroclors</i>								
Aroclor-1016								
Aroclor-1221								
Aroclor-1232								
Aroclor-1242								
Aroclor-1248								
Aroclor-1254								
Aroclor-1260								
Total PCBs	*			*			*	
<i>PCB Congeners</i>								
PCB 105								
PCB 108								
PCB 114								
PCB 118								
PCB 126								
PCB 127								
PCB 128								
PCB 132/153								
PCB 138/160								
PCB 15								
PCB 156								
PCB 157								
PCB 162								
PCB 167								
PCB 169								
PCB 170/190								
PCB 18/17								
PCB 180								
PCB 187								
PCB 189								
PCB 195/208								
PCB 206								
PCB 209								

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Chemicals of Potential Concern (COPCs)	Microbial Community	Aquatic Plant Community		Benthic Invertebrate Community		Fish Community		
	WS	SW	PW	WS	PW	SW	WS	PW
<i>PCB Congeners (cont.)</i>								
PCB 28								
PCB 29								
PCB 37								
PCB 44								
PCB 5/8								
PCB 52								
PCB 58								
PCB 60								
PCB 61/70								
PCB 66								
PCB 77								
PCB 77/110								
PCB 79								
PCB 80								
PCB 81								
PCB 87/115								
PCB 90/101								
PCB 201/157/173								
<i>Organochlorine Pesticides</i>								
Aldrin					*			
Dieldrin					*		*	
<i>Phthalates</i>								
Benzylbutylphthalate								
Bis(2-ethylhexyl)phthalate	*				*			
Diethylphthalate								
Dimethylphthalate								
Di-n-butylphthalate								
Di-n-octylphthalate								
<i>Chlorinated Benzenes</i>								
1,2,3,4-Tetrachlorobenzene								
1,2,3-Trichlorobenzene								
1,2,4,5-Tetrachlorobenzene								
1,2,4-Trichlorobenzene								
1,2-Dichlorobenzene								
1,3-Dichlorobenzene								
1,4-Dichlorobenzene								
Hexachloro-1,3-butadiene					*			
Hexachlorobenzene					*			
Pentachlorobenzene								

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Chemicals of Potential Concern (COPCs)	Microbial Community	Aquatic Plant Community		Benthic Invertebrate Community		Fish Community		
	WS	SW	PW	WS	PW	SW	WS	PW
<i>Chlorinated Ethanes</i>								
1,1,1-Trichloroethane								
1,2-Dichloroethane								
<i>PCDDs and PCDFs</i>								
1,2,3,4,6,7,8-HpCDD								
1,2,3,4,7,8-HxCDD								
1,2,3,6,7,8-HxCDD								
1,2,3,7,8,9-HxCDD								
1,2,3,7,8-PeCDD								
2,3,7,8-TCDD								
OCDD								
Total HpCDD								
Total HxCDD								
Total PeCDD								
Total TCDD								
1,2,3,4,6,7,8-HpCDF								
1,2,3,4,7,8,9-HpCDF								
1,2,3,4,7,8-HxCDF								
1,2,3,6,7,8-HxCDF								
1,2,3,7,8,9-HxCDF								
1,2,3,7,8-PeCDF								
2,3,4,6,7,8-HxCDF								
2,3,4,7,8-PeCDF								
2,3,7,8-TCDF								
OCDF								
Total HpCDF								
Total HxCDF								
Total PeCDF								
Total TCDF								
Total Toxic Equivalentents (TEQs)						*		*
<i>Other COPCs</i>								
Acetone								
Carbon Disulfide								

WS = whole sediment; PW = pore water; SW = surface water; PAHs = polycyclic aromatic hydrocarbons; PCBs = polychlorinated biphenyls

Figures
